Claims

What is claimed:

1. An apparatus for refrigeration and heating comprising:

a) a cold supply pipe for delivering cold fluid, a cold return pipe for returning cold fluid, and a hot supply/return pipe for delivering and returning hot fluid,

b) an upstream two position three-way valve connected to the cold supply pipe and to the hot supply/return pipe, a modulating three-way mixing valve located downstream of the upstream two position three-way valve,

c) a fan coil unit pump located downstream of the modulating three-way mixing valve,

d) a fan coil unit comprising a coil and a fan for blowing air through the coil and the fan coil unit pump for pumping fluid through the coil,

e) a fan coil unit pump located downstream of the modulating three-way mixing valve wherein the modulating three-way mixing valve is for allowing none, a portion of, or all of the fluid in the coil to be recirculated through the coil by the fan coil unit pump,

f) a downstream two position three-way valve located downstream of the modulating three-way mixing valve and for returning fluid to the cold return pipe or the hot supply/return pipe,

g) a means for computerized control,

h) a total air pressure drop sensor to detect a pressure differential across the coil and to sense a predetermined maximum pressure differential across the

coil, the total air pressure sensor in electronic communication with the means for computerized control.

2. The apparatus for refrigeration and heating according to claim 1 wherein when the total air pressure drop sensor detects a pressure differential across the coil less than about one half of inch mercury the upstream two position three-way valve connected to the cold supply pipe is instructed to open to the flow of cold fluid, and the modulating three-way mixing valve is instructed to open to the flow of cold fluid by the means for computerized control, and the fan coil unit pump pumps the cold fluid through the coil.

3. The apparatus for refrigeration and heating according to claim 1 wherein the predetermined maximum pressure drop across the coil is about one half inch mercury.

4. The apparatus for refrigeration and heating according to claim 3 wherein when the predetermined maximum pressure drop across the coil is reached, the means for computerized control instructs the upstream two position three-way valve to open to the flow of hot fluid for melting any accumulated ice on the coil.

5. The apparatus for refrigeration and heating according to claim 4 further comprising a fan coil thermostat for detecting the temperature of the fluid exiting the coil and in communication with the means for computerized control, and wherein the upstream two

position three way valve closes to the flow of hot fluid when the fan coil thermostat detects the temperature of the fluid exiting the coil is about 45 degrees Fahrenheit.

6. The apparatus for refrigeration and heating according to claim 5 wherein when the temperature of about 45 degrees Fahrenheit is detected, the upstream two position three way valve opens to the flow of cold fluid.

7. The apparatus for refrigeration and heating according to claim 1 further comprising a refrigeration machine for comprising a condenser and an evaporator, and the condenser is connected to the hot supply/return pipe and the evaporator is connected to the cold supply pipe, and a cold return pipe connected to the evaporator.

8. The apparatus for refrigeration and heating according to claim 5 further comprising a cold fluid storage tank for storing cold fluid and a hot fluid storage tank for storing hot fluid.

9. The apparatus for refrigeration and heating according to claim 1 further comprising:

a) a heat rejection device comprising an evaporative cooler comprising fan and a heat rejection coil,

b) an evaporative cooler pump for pumping hot fluid from the condenser through the heat rejection coil,

c) sprayers for spraying the heat rejection coil with water to cool the hot fluid before it is returned to the condenser.

10. The apparatus for refrigeration and heating according to claim 1 wherein the fluid comprises one or more of synthetic fluids, ethylene glycol mixed with water, eutetic mixtures of phenyl ether and diphenyl, isomers of an alkylated aromatic, and blends thereof.

11. A three pipe cooling and heating apparatus for cooling a room comprising:

a) a refrigeration machine comprising a condenser and an evaporator,

b) a cold supply pipe leading from the evaporator and a combination hot supply/return pipe leading from the condenser,

c) a fan coil unit comprising a coil and, a fan coil pump for circulating fluid through the fan coil unit, the fan for blowing room air across the coil, the fan coil unit operable between a cooling mode wherein a cold fluid is circulated through the coil by the fan coil pump and a heating mode wherein hot fluid is circulated through the coil by the fan coil pump,

d) the cold supply pipe and hot supply return pipe leading to a two position three-way valve,

e) a modulating three-way mixing valve located at a downstream location from the two position three-way

valve, a fan coil thermostat in a controlling type relationship with the modulating three-way mixing valve,

f) the modulating valve for directing the flow of the fluid pumped by the fan coil pump so that all, none, or a percentage of the fluid being pumped by the fan coil pump is recirculated the fan coil unit,

g) a total pressure drop sensor positioned to detect a total pressure drop across the coil an wherein if the total pressure drop reaches about one half and inch of mercury hot fluid is circulated through the coil to melt accumulated ice.

12. A three pipe cooling and heating apparatus for cooling a room comprising according to claim 11 further comprising a heat rejection device for removing excess heat from the apparatus.

13. A three pipe cooling and heating apparatus for cooling a room according to claim 11 further comprising a salvage heat exchanger thermostat and a salvage heat exchanger controlled by the thermostat, the salvage heat exchanger for removing heat.

14. A method of refrigerating and cooling comprising the following acts:

a) providing a cold supply pipe for delivering cold fluid, providing a cold return pipe for returning cold fluid, and providing a hot supply/return pipe for delivering and returning hot fluid,

b) providing an upstream two position three-way valve connected to the cold supply pipe and to the hot

supply/return pipe, and locating a modulating three-way mixing valve located downstream of the upstream two position three-way valve,

c) positioning a fan coil unit pump downstream of the modulating three-way mixing valve,

d) providing a fan coil unit comprising a coil and a fan and blowing air through the coil with the fan the fan coil unit pump for pumping fluid through the coil,

e) providing a fan coil unit pump located downstream of the modulating three-way mixing valve wherein the modulating three-way mixing valve is for allowing none, a portion of, or all of the fluid in the coil to be recirculated through the coil by the fan coil unit pump,

f) positioning a downstream two position three-way valve downstream of the modulating three-way mixing valve for returning fluid to the cold return pipe or the hot supply/return pipe,

g) providing a means for computerized control,

h) providing a total air pressure drop sensor for detecting a pressure differential across the coil and for sensing a predetermined maximum pressure differential across the coil, the total air pressure sensor in electronic communication with the means for computerized control.

15. The method of refrigeration and cooling according to claim 14 comprising the further acts detecting a pressure differential across the coil less than about one half of inch mercury and opening the upstream two position three-way valve connected to the cold supply pipe to the flow of cold fluid, and opening the

modulating three-way mixing valve to the flow of cold fluid and pumping the cold fluid through the coil.

16. The method of refrigeration and heating according to claim 14 comprising the further act of setting the predetermined maximum pressure drop across the coil to be about a one half inches of mercury.